Electronic Supplementary Material (ESI) for RSC Advances.

Halide-Free Neodymium Phosphate Based Catalyst for Highly *Cis*-1,4 Selective Polymerization of Dienes

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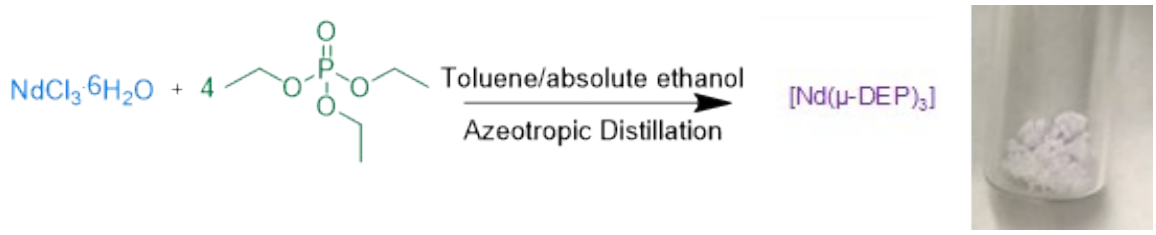

Scheme S1. Synthesis of $[Nd(\mu\text{-}DEP)_3]_x$ *via* azeotropic distillation method.

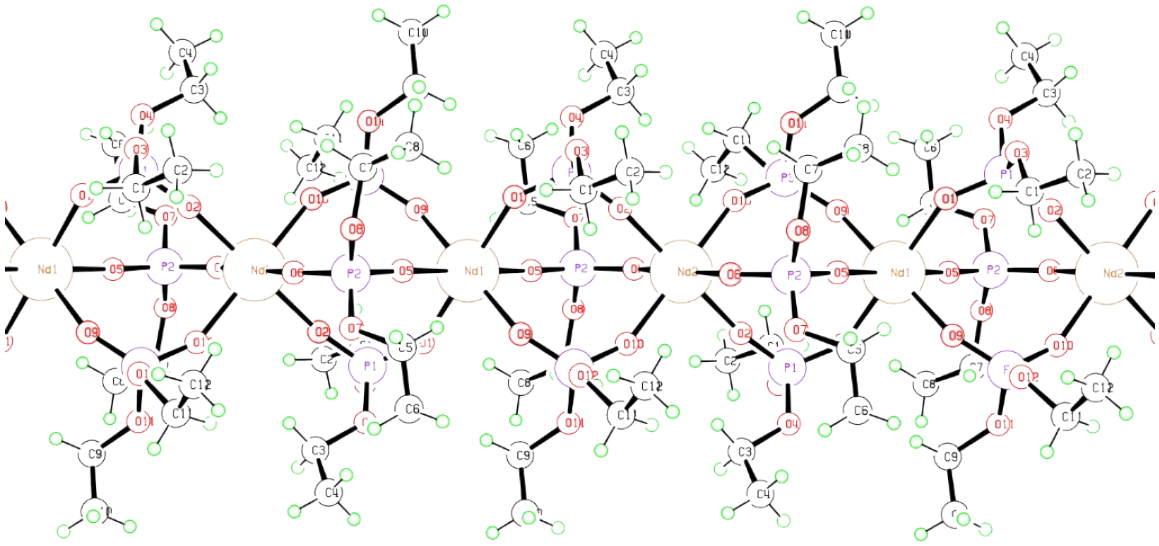

Figure S1. ORTEP diagram for $[Nd(\mu\text{-}DEP)_3]_x$

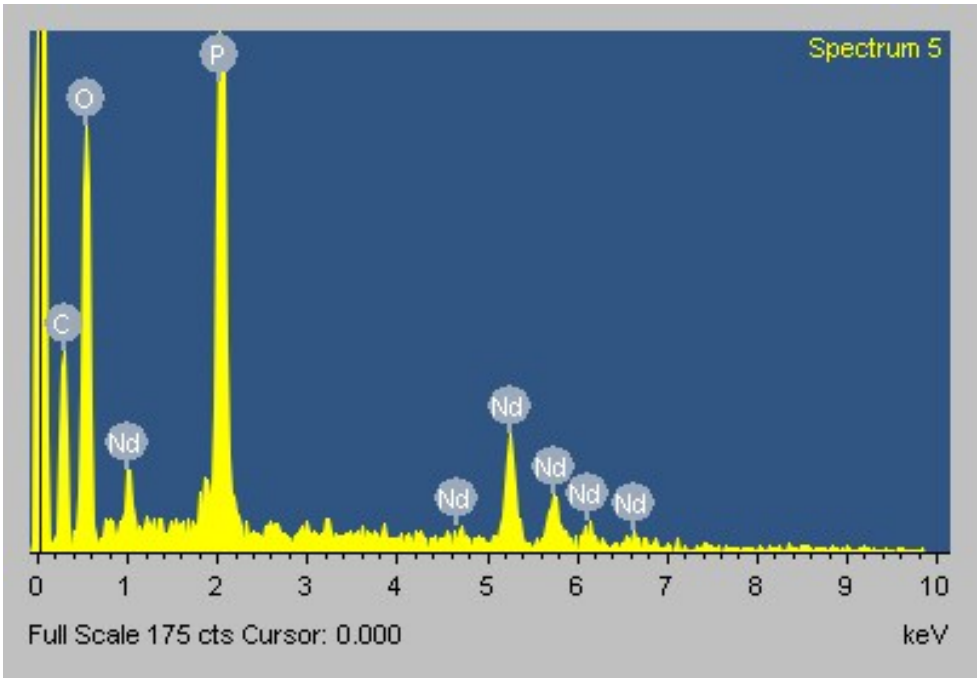

Figure S2. EDX result of $[Nd(\mu\text{-}DEP)_3]_x$.

Table S1. Control experiments for the poly(*β*-myrcene) synthesis.

Nd compound	[Nd]:[TIBA]	Yield (%)	M_n (g/mol)	PDI	Cis-1,4 (%)
$NdCl_3 \cdot 6H_2O$	1:0	trace	-	-	-
$[Nd(\mu\text{-}DEP)_3]_x$	1:0	trace	-	-	-
TIBA	0:1	Insoluble cross-linked polymer			-
$[Nd(\mu\text{-}DEP)_3]_x$/TIBA	1:30	100	13,000	1.80	96.0

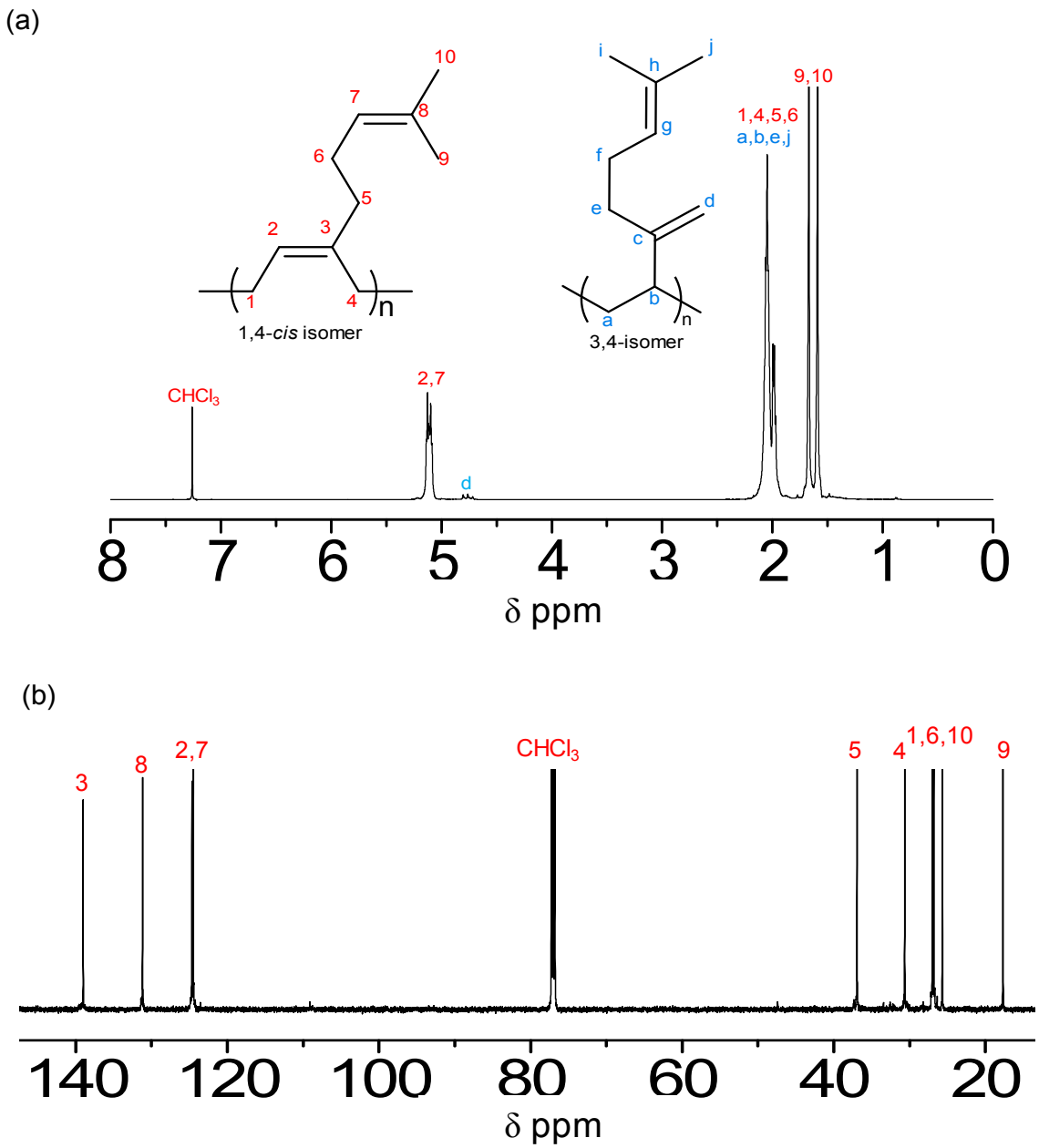

Figure S3. (a) ^{1}H and (b) ^{13}C NMR spectrum of the poly(*β*-myrcene). Reaction condition: [Nd]:[TIBA]:[*β*-myrcene] = 1:30:250 at room temperature for 2 hours.

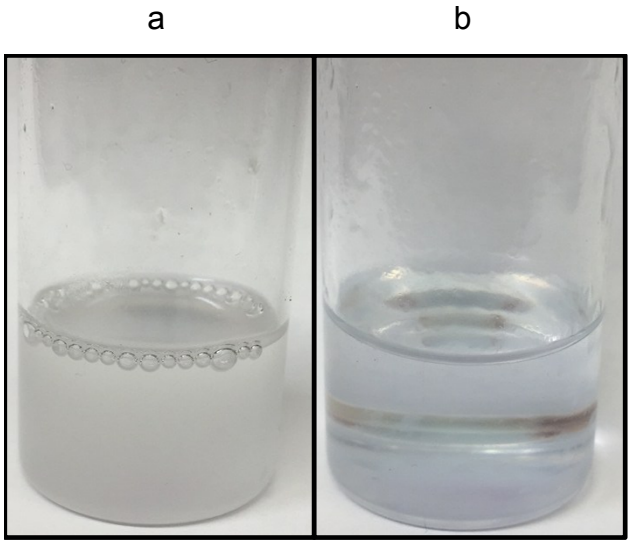

Figure S4. Solubility test before and after addition of the co-catalyst TIBA, (a) the Nd catalyst in toluene, (b) after addition of TIBA.

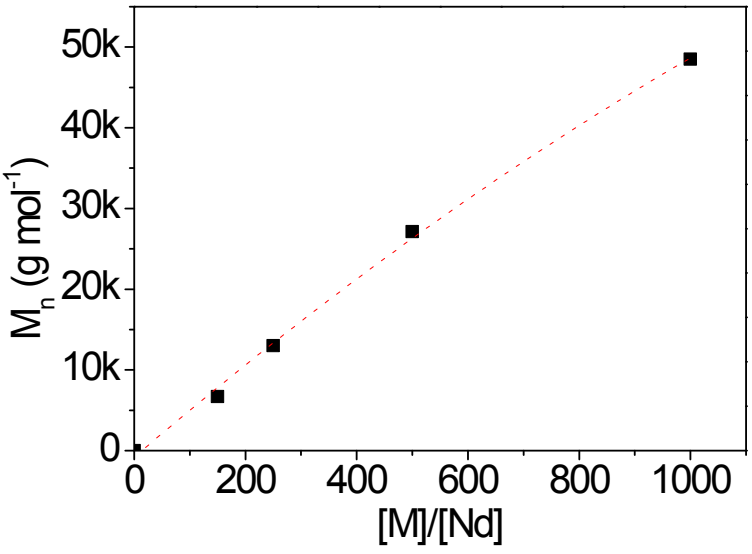

Figure S5. M_n versus [M]/[Nd] ratio**.** Reaction conditions: room temperature, at the molar ratio of [M]:[Nd]:[TIBA] = 250:1:30.

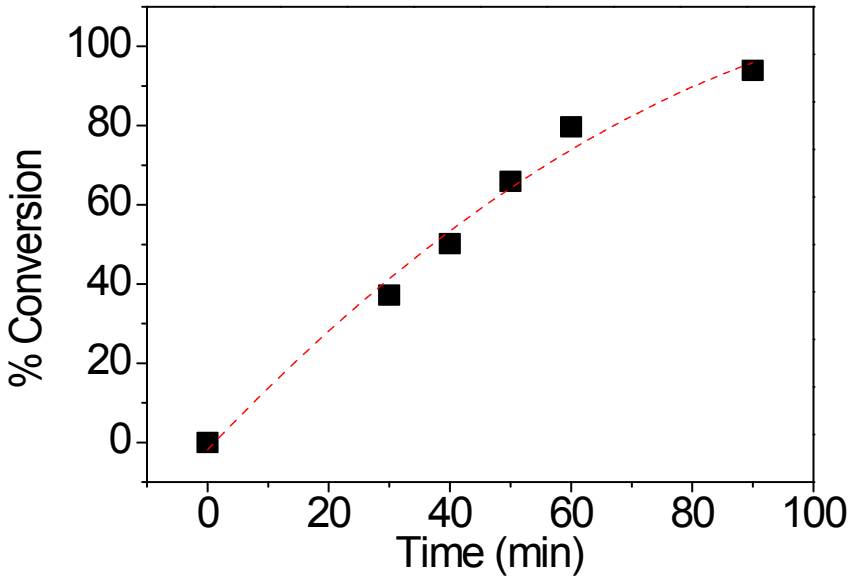

Figure S6. Conversion versus time for the polymerization of *β*-myrcene at room temperature for the ratio of [M]:[Nd]:[TIBA] = 250:1:30.